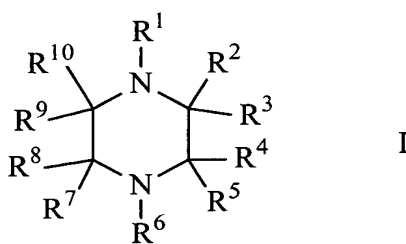


### Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

### Listing of Claims:





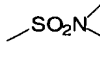

1 (withdrawn): An element for the attachment of protein arrays, the element comprising a surface to which are attached a plurality of piperazine functional groups wherein the piperazine functional groups are represented by Formula I:



where

$R^1, R^2, R^3, R^4, R^5, R^6, R^7, R^8, R^9, R^{10}$ , are hydrogen, alkyl, alkenyl, alkynyl, alkylhalo, cycloalkyl, cycloalkenyl, alkylthio, alkoxy, with the proviso that at least one of  $R^1$  to  $R^{10}$  be a non-labile chemical unit that attaches the piperazine functional group to the surface of the element.

2 (withdrawn): The element of claim 1 wherein the chemical units are attached to the surface by a covalent bond.

3 (withdrawn): The element of claim 1 wherein the chemical units comprise a carbon atom, an oxygen atom, a sulfur atom, a carbonyl group , a carboxylic ester group , a carboxylic amide group , a sulfonyl group , a sulfonamide group , an ethyleneoxy group, a polyethyleneoxy group, or an amino group , where substituents X, Y, and Z are each independently a hydrogen atom, or an alkyl group of 1-10 carbon atoms, a

substituted or unsubstituted aryl group of 6 to 14 carbon atoms, or a substituted or unsubstituted cycloalkyl group of 5 to 14 carbon atoms, a substituted or unsubstituted, saturated or unsaturated heterocyclic group, or a cyano group.

4 (withdrawn): The element of claim 1 wherein the piperazine functional groups are bound to a polymer.

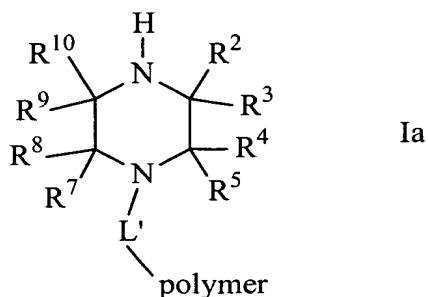
5 (withdrawn): The element of claim 1 wherein the piperazine functional groups include organic and inorganic addition salts of the groups defined by Formula I.

6 (withdrawn): The element of claim 1 wherein the chemical units comprise solubilizing groups.

7 (withdrawn): The element of claim 6 wherein the solubilizing groups include carboxylic acid, sulfonic acid, phosphonic acid, hydroxamic acid, sulfonamide, hydroxy groups or corresponding salts thereof.

8 (withdrawn): The element of claim 1 wherein at least one of  $R^1$  and  $R^6$  in Formula I is hydrogen.

9 (withdrawn): The element of claim 1 wherein one of  $R^1$  and  $R^6$  CH in Formula I is hydrogen, and one of  $R^1$  and  $R^6$  is a linking group ( $L'$ ) as represented in Formula Ia:



10 (withdrawn): The element of claim 1 wherein  $R^2$  to  $R^5$ , and  $R^7$  to  $R^{10}$  in Formula I are all hydrogen.

11 (withdrawn): The element of claim 9 wherein the polymer to which the piperazine groups are bound has a number average molecular weight between 1000 and 200,000 AMU.

12 (withdrawn): The element of claim 9 wherein the polymer to which the piperazine groups are bound has a number average molecular weight between 2000 and 50,000 AMU.

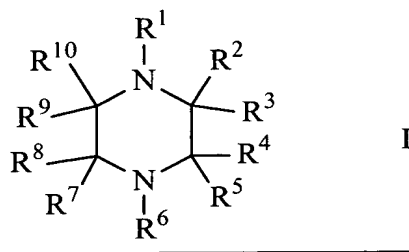
13 (withdrawn): The element of claim 9 wherein the polymer is formed *in situ*.

14 (withdrawn): The element in claim 1 where  $R^2$ ,  $R^3$ ,  $R^4$ ,  $R^5$ ,  $R^7$ ,  $R^8$ ,  $R^9$ , or  $R^{10}$  independently represents hydrogen.

15 (withdrawn): The element of claim 9 wherein the piperazine containing polymer incorporates 1-(4-vinylbenzyl)piperazine, or methacrylic acid piperazine amide, or the inorganic acid or organic acid addition salts thereof.

16 (withdrawn): The element of claim 1 wherein the surface comprises gelatin.

17 (currently amended): An element for the attachment of protein arrays, the element comprising a surface to which are attached  
a plurality of piperazine functional groups;  
a polymer;  
a crosslinking compound A-L-B;  
wherein A is a functional group capable of interacting with a piperazine functional group of the invention; L is a linking group capable of interacting with A and with B; and B is a specific functionality that provides one or more reactive units capable of interacting with a protein capture agent, and wherein the piperazine functional groups are represented by Formula I:



where

R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup>, R<sup>4</sup>, R<sup>5</sup>, R<sup>6</sup>, R<sup>7</sup>, R<sup>8</sup>, R<sup>9</sup>, R<sup>10</sup>, are hydrogen, alkyl, alkenyl, alkynyl, alkylhalo, cycloalkyl, cycloalkenyl, alkylthio, alkoxy, with the proviso that at least one of the groups R<sup>1</sup> to R<sup>10</sup> be a linkage group (L').

18 (original): The element in claim 17 wherein at least one of the functional groups A or B in A-L-B is aldehyde, epoxy, hydrazide, vinylsulfone, succinimidyl ester, carbodiimide, maleimide, dithio, iodoacetyl, isocyanate, isothiocyanate, or aziridine.

19 (original): The element in claim 18 wherein at least one of the functional groups in A-L-B is vinylsulfone.

20 (canceled):

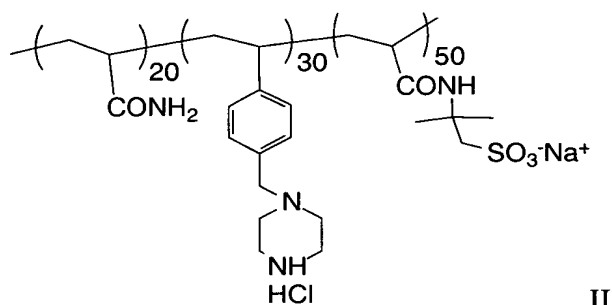
21 (currently amended): The element of claim ~~17~~<sup>20</sup> wherein the linkage group L' comprises any combination of non-labile covalently bonded chemical units sufficient to connect the piperazine functional group to the surface.

22 (original): The element of claim 21 wherein the surface contains a polymer.

23 (original): The element of claim 17 wherein the crosslinking compound A-L-B is bis(vinylsulfonyl)methane, bis(vinylsulfonyl)methyl ether, or bis(vinylsulfonylacetamido)ethane.

24 (original): The element in claim 17 where the crosslinking compound A-L-B is bis(vinylsulfonyl)methane and the piperazine containing polymer comprising 1-(4-vinylbenzyl)piperazine or methacrylic acid piperazine amide monomers, or the corresponding inorganic acid or organic acid addition salts thereof.

25 (original): The element of claim 17 wherein the crosslinking compound A-L-B is bis(vinylsulfonyl)methane and the piperazine polymer is defined by Formula II.



where 20, 30, and 50 represent the relative molar amounts of each monomeric unit.

26 (original): The element of claim 24 wherein the surface contains gelatin.

27 (original): The element of claim 25 wherein the surface contains gelatin.